

What is claim d is:

1. An image processing apparatus for converting image data between a raster scan order and a block scan order, comprising:
 - an image data processor for supplying image data of a raster scan order having a given horizontal resolution and a given vertical resolution;
 - a line memory for storing image data of a plurality of lines;
 - an address generating block for generating a common read/write address for the line memory so that only one line memory is required for read and write operations; and
 - an encoder receiving image data of the block scan order from the line memory.
2. The apparatus of claim 1, wherein the address generating block includes:
 - a block address generator for generating an address of a block which image data is read from and written into;
 - a line offset generator for providing a line offset between an earlier common read/write address and a present common read/write address for the line memory; and
 - an address generator for generating the common read/write address for the line memory based on the block address and the line offset.
3. The apparatus of claim 1, wherein the encoder is a Joint Photographic Experts Group (JPEG) engine.
4. The apparatus of 2, wherein the block includes image data of horizontal-direction pixels and vertical-direction pixels.
5. The apparatus of claim 2, wherein the block address generator provides a block offset between a start address of a present block and a start address of a next block for the line memory.
6. The apparatus of claim 5, wherein the block offset is initially set to 1.

7. The apparatus of claim 2, wherein the line offset is initially set to a value defined by the given horizontal resolution divided by a number of horizontal-direction pixels in a given block.
8. The apparatus of claim 2, wherein the line offset generator generates a next line offset between a present common read/write address and a next common read/write address for the line memory.
9. The apparatus of claim 8, wherein the block address and the next line offset are respectively reset at a start of every phase.
10. The apparatus of claim 2, wherein the address generator generates an anchor address for the line memory based on the block address, and generates a sequential number of the common read/write address from the generated anchor address.
11. The apparatus of claim 10, wherein the address generator increases the anchor address to equal the line offset after the address generator generates the sequential number of the common read/write address.
12. The apparatus of claim 10, wherein the address generator decreases the anchor address to the given horizontal resolution minus one ($H-1$) when the anchor address has increased so as to equal or exceed ($H-1$).
13. The apparatus of claim 5, wherein the block address generator increases the block address as much as the block offset after the block address generator generates the common read/write addresses for a block.
14. The apparatus of claim 2, wherein the block address generator decreases the block address to the given horizontal resolution minus one ($H-1$) when the block address has increased so as to equal or exceed ($H-1$).

15. The apparatus of claim 5, wherein the block offset is set to the line offset at an end of every phase.

16. The apparatus of claim 8, wherein the line offset is set to the next line offset at an end of every phase.

17. The apparatus of claim 16, wherein a phase comprises an number of blocks equal to the given horizontal resolution divided by a number of horizontal-direction pixels in a given block.

18. The apparatus of claim 15, wherein image data having the given horizontal resolution (H) and the vertical resolution (V) comprises V/v phases, wherein v represents a number of vertical-direction pixels in a given block.

19. An image processing method for converting image data between a raster scan order and a block scan order, comprising the steps of:

receiving image data of a raster scan order having a given horizontal resolution and a given vertical resolution;

generating a common read/write address for a line memory of a plurality of lines;

reading image data of a block scan order from the common read/write address of the line memory;

storing image data of the raster scan order in the common read/write address of the line memory; and

transmitting image data of the block scan order to an encoder,
wherein the generating a common read/write address step further comprises:

- (a) initializing a block offset and a line offset;
- (b) initializing a block address and a next line offset;
- (c) setting an anchor address to the block address;
- (d) generating a sequential number of common read/write addresses from the anchor address;
- (e) increasing the anchor address as much as the line offset;

- (f) repeating steps (d)~(e) until the common read/write addresses for all blocks are generated;
- (g) increasing the block address as much as the block offset;
- (h) increasing the next line offset as much as the line offset;
- (i) repeating the steps (c)~(h) until image data for a number of blocks equal to the given horizontal resolution divided by a number of horizontal-direction pixels in a given block are processed;
- (j) setting the block offset to the line offset;
- (k) setting the line offset to the next line offset;
- (l) repeating the steps (b)~(k) during a time when image data of the raster scan order is supplied.

20. The method of claim 19, wherein step (e) includes reducing the anchor address so as to substantially equal the horizontal resolution, when the anchor address increase equals or exceeds the horizontal resolution.

21. The method of claim 19, wherein step (h) includes reducing the block address so as to substantially equal the horizontal resolution, when the block address increase equals or exceeds the horizontal resolution.

22. An image processing method for converting image data between a raster scan order and a block scan order, comprising the steps of:

- receiving image data of a raster scan order having a given horizontal resolution and a given vertical resolution;
- generating a common read/write address for a line memory of a plurality of lines;
- reading image data of a block scan order from the common read/write address of the line memory;
- storing image data of the raster scan order in the common read/write address of the line memory; and
- transmitting image data of the block scan order to an encoder,

wherein the generating a common read/write address step further comprises:

- (a) initializing a block offset and a line offset;
- (b) generating an anchor address as a function of the block offset, line offset and horizontal resolution;
- (c) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;
- (d) repeating steps (b)~(c) until the common read/write addresses for all blocks are generated;
- (e) repeating steps (b)~(c) until a block sequence of image data (i) for the plurality of lines (v) has sequentially increased from 0 to v-1;
- (f) setting the block offset to the line offset;
- (g) setting a remnant obtained as a function of the line offset and horizontal resolution to the line offset; and
- (h) repeating steps (b)~(g) during a time when image data of the raster scan order is supplied.

23. An image processing method for converting image data between a raster scan order and a block scan order, comprising the steps of:

- receiving image data of a raster scan order having a given horizontal resolution and a given vertical resolution;
- generating a common read/write address for a line memory of a plurality of lines;
- reading image data of a block scan order from the common read/write address of the line memory;
- storing image data of the raster scan order in the common read/write address of the line memory; and
- transmitting image data of the block scan order to an encoder, wherein the generating a common read/write address step further comprises:
 - (a) initializing a block offset and a line offset;
 - (b) initializing a block address;
 - (c) initializing a line address;

(d) generating an anchor address as a function of the block address, line address and horizontal resolution;

(e) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;

(f) increasing the line address as much as the line offset;

(g) repeating steps (d)~(f) until the common read/write addresses for all blocks are generated;

(h) increasing the block address as much as the block offset;

(i) repeating steps (c)~(h) until image data for a number of blocks equal to the horizontal resolution divided by the number of horizontal-direction pixels in a given block are processed;

(j) setting the block offset to the line offset;

(k) setting a remnant obtained as a function of the line offset, horizontal resolution and number of horizontal-direction pixels in a given block to the line offset; and

(l) repeating steps (b)~(k) during a time when image data of the raster scan order is supplied.

24. An image processing method for converting image data between a raster scan order and a block scan order, comprising the steps of:

receiving image data of a raster scan order having a given horizontal resolution and a given vertical resolution;

generating a common read/write address for a line memory of a plurality of lines;

reading image data of a block scan order from the common read/write address of the line memory;

storing image data of the raster scan order in the common read/write address of the line memory; and

transmitting image data of the block scan order to an encoder,
wherein the generating a common read/write address step further comprises:

(a) initializing a block offset and a line offset;

- (b) initializing a block address;
- (c) initializing a line address;
- (d) generating an anchor address based on the block address and the line address;
- (e) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;
- (f) increasing the line address as much as the line offset;
- (g) repeating steps (d)~(f) until the common read/write addresses for all blocks are generated;
- (h) increasing the block address as much as the block offset;
- (i) repeating steps (c)~(h) until image data for a number of blocks equal to the horizontal resolution divided by the number of horizontal-direction pixels in a given block (H/h) are processed;
- (j) setting the block offset to the line offset;
- (k) setting the line offset * H/h to the line offset; and
- (l) repeating steps (b)~(k) during the time when image data of the raster scan order is supplied.

25. The method of claim 24, wherein step (d) includes reducing the anchor address so as to substantially equal the horizontal resolution, when the anchor address increase equals or exceeds the horizontal resolution.

26. The method of claim 24, wherein step (f) includes reducing the line address so as to be substantially equal the horizontal resolution, when the line address increase equals or exceeds the horizontal resolution.

27. The method of claim 24, wherein step (h) includes reducing the block address so as to be substantially equal to the horizontal resolution, when the block address increase equals or exceeds the horizontal resolution.

28. The method of claim 24, wherein step (k) includes setting the remnant to the line offset, when the set line offset equals or exceeds the horizontal resolution.

29. An image processing method for converting image data between a raster scan order and a block scan order, comprising the steps of:

receiving image data of a raster scan order having a given horizontal resolution and a given vertical resolution;

generating a common read/write address for a line memory of a plurality of lines;

reading image data of a block scan order from the common read/write address of the line memory;

storing image data of the raster scan order in the common read/write address of the line memory; and

transmitting image data of the block scan order to an encoder,
wherein the generating a common read/write address step further comprises:

(a) initializing a block offset and a line offset;

(b) initializing a block address;

(c) setting an anchor address to the block address;

(d) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;

(e) increasing the anchor address as much as the line offset;

(f) repeating steps (d)~(e) until the common read/write addresses for $h \times v$ blocks are all generated;

(g) increasing the block address as much as the block offset;

(h) repeating steps (c)~(g) until image data for a number of blocks equal to the horizontal resolution divided by the number of horizontal-direction pixels in a given block (H/h) are processed;

(i) setting the block offset to the line offset;

(j) setting a remnant obtained as a function of the line offset, H/h and horizontal resolution to the line offset; and

(k) repeating steps (b)~(j) during a time when image data of the raster scan order is supplied.

30. The method of claim 29, wherein step (e) includes reducing the anchor address so as to substantially equal the horizontal resolution, when the anchor address increase equals or exceeds the horizontal resolution.

31. The method of claim 29, wherein step (g) further includes reducing the block address so as to be substantially equal to the horizontal resolution, when the block address increase equals or exceeds the horizontal resolution.

32. An method for converting image data between a raster scan order and a block scan order, comprising the steps of:

- receiving image data of a raster scan order having a given horizontal resolution and a given vertical resolution;

- generating a common read/write address for a line memory of a plurality of lines;

- reading image data of a block scan order from the common read/write address of the line memory;

- storing image data of the raster scan order in the common read/write address of the line memory; and

- transmitting image data of the block scan order to an encoder.

33. The method of claim 32, wherein the generating a common read/write address step is based in part on generating an anchor address, the anchor address representing a segment of pixels of image data that is read from and written to the line memory.

34. The method of claim 33, wherein the anchor address is generated based on at least one of a block address of a block, of the block scan order, in which image data is read from and written to in the line memory, and a block offset between a start address of a present block and a start address of a next block for the line memory.

35. The method of claim 34, wherein the anchor address is set based only on the block address.

36. The method of claim 35, wherein generating a common read/write address further comprises:

- (a) initializing the block offset and a line offset;
- (b) initializing the block address and a next line offset;
- (c) setting the anchor address to the block address;
- (d) generating a sequential number of common read/write addresses from the anchor address;
- (e) increasing the anchor address as much as the line offset;
- (f) repeating steps (d)~(e) until the common read/write addresses for all blocks are generated;
- (g) increasing the block address as much as the block offset;
- (h) increasing the next line offset as much as the line offset;
- (i) repeating the steps (c)~(h) until image data for a number of blocks equal to the given horizontal resolution divided by a number of horizontal-direction pixels in a given block are processed;
- (j) setting the block offset to the line offset;
- (k) setting the line offset to the next line offset;
- (l) repeating the steps (b)~(k) during a time when image data of the raster scan order is supplied.

37. The method of claim 35, wherein generating a common read/write address further comprises:

- (a) initializing the block offset and a line offset;
- (b) initializing the block address;
- (c) setting the anchor address to the block address;
- (d) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;
- (e) increasing the anchor address as much as the line offset;
- (f) repeating steps (d)~(e) until the common read/write addresses for $h \times v$ blocks are all generated;
- (g) increasing the block address as much as the block offset;

(h) repeating steps (c)~(g) until image data for a number of blocks equal to the horizontal resolution divided by the number of horizontal-direction pixels in a given block (H/h) are processed;

(i) setting the block offset to the line offset;

(j) setting a remnant obtained as a function of the line offset, H/h and horizontal resolution to the line offset; and

(k) repeating steps (b)~(j) during a time when image data of the raster scan order is supplied.

38. The method of claim 34, wherein the anchor address is generated based on the block offset, a line offset between an earlier common read/write address and a present common read/write address for the line memory, and the horizontal resolution.

39. The method of claim 38, wherein generating a common read/write address further comprises:

(a) initializing the block offset and the line offset;

(b) generating the anchor address as a function of the block offset, line offset and horizontal resolution;

(c) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;

(d) repeating steps (b)~(c) until the common read/write addresses for all blocks are generated;

(e) repeating steps (b)~(c) until a block sequence of image data (i) for the plurality of lines (v) has sequentially increased from 0 to $v-1$;

(f) setting the block offset to the line offset;

(g) setting a remnant obtained as a function of the line offset and horizontal resolution to the line offset; and

(h) repeating the steps (b)~(g) during a time when image data of the raster scan order is supplied.

40. The method of claim 34, wherein the anchor address is generated based on at least the block address and a line address

41. The method of claim 40, wherein generating a common read/write address further comprises:

- (a) initializing the block offset and a line offset;
- (b) initializing the block address;
- (c) initializing the line address;
- (d) generating the anchor address as a function of the block address, line address and horizontal resolution;
- (e) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;
- (f) increasing the line address as much as the line offset;
- (g) repeating steps (d)~(f) until the common read/write addresses for all blocks are generated;
- (h) increasing the block address as much as the block offset;
- (i) repeating steps (c)~(h) until image data for a number of blocks equal to the horizontal resolution divided by the number of horizontal-direction pixels in a given block are processed;
- (j) setting the block offset to the line offset;
- (k) setting a remnant obtained as a function of the line offset, horizontal resolution and number of horizontal-direction pixels in a given block to the line offset; and
- (l) repeating steps (b)~(k) during a time when image data of the raster scan order is supplied.

42. The method of claim 40, wherein generating a common read/write address further comprises:

- (a) initializing the block offset and a line offset;
- (b) initializing the block address;
- (c) initializing the line address;

(d) generating the anchor address based on the block address and the line address;

(e) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;

(f) increasing the line address as much as the line offset;

(g) repeating steps (d)~(f) until the common read/write addresses for all blocks are generated;

(h) increasing the block address as much as the block offset;

(i) repeating steps (c)~(h) until image data for a number of blocks equal to the horizontal resolution divided by the number of horizontal-direction pixels in a given block (H/h) are processed;

(j) setting the block offset to the line offset;

(k) setting the line offset * H/h to the line offset; and

(l) repeating steps (b)~(k) during the time when image data of the raster scan order is supplied.

43. An image processing apparatus for converting image data between a raster scan order and a block scan order in accordance with the method of claim 19.

44. An image processing apparatus for converting image data between a raster scan order and a block scan order in accordance with the method of claim 22.

45. An image processing apparatus for converting image data between a raster scan order and a block scan order in accordance with the method of claim 23.

46. An image processing apparatus for converting image data between a raster scan order and a block scan order in accordance with the method of claim 24.

47. An image processing apparatus for converting image data between a raster scan order and a block scan order in accordance with the method of claim 29.

48. An image processing apparatus for converting image data between a raster scan order and a block scan order in accordance with the method of claim 32.